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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,856	03/04/2004	Shigeru Shirayone	648-43608X00	5252
20457 7590 01/23/2009 ANTONELLI, TERRY, STOUT & KRAUS, LLP 1300 NORTH SEVENTEENTH STREET SUITE 1800 ARLINGTON, VA 22209-3873				
EXAMINER				
KO, STEPHEN K				
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1792				
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01/23/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/791,856

**Applicant(s)**

SHIRAYONE ET AL.

**Examiner**

STEPHEN KO

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 November 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3,8-10 and 13-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,8-10 and 13-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/S508)  
Paper No(s)/Mail Date 09/17/2008
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. In view of the appeal brief filed on 03<sup>rd</sup> November 2008, PROSECUTION IS HEREBY REOPENED. New ground of rejections are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have been increased since they were previously paid, then appellant must pay the difference between the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing below:

/Michael Kornakov/

Supervisory Patent Examiner, Art Unit 1792.

Claims 1, 3, 8-10, 13-17 are currently pending on the application.

***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 3, 8-9, 13, and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Qian et al (US 6,136,211).

For claim 1, Qian et al teach a method for etching a substrate in an etching chamber, and simultaneously cleaning a surface of the etching chamber wall, wherein the etching chamber comprising a plasma generation device including a showerhead (col.5, L.67, not shown); an antenna (Fig.2, #115); and a plasma power source (Fig.2); a high-frequency power applying means (Fig.3, #160); a exhaust (read as excavating device connected and which has its interior evacuated, Fig.2); and a gas supply device

(Fig.2, #85), comprising the steps of placing a substrate on a chuck disposed within the etching chamber (read as placing a Si wafer, with no patterns printed thereon, Fig.2, #145, col.7, L.57); providing a period for cleaning a residue deposited in the etching chamber by generating a plasma from a processing gas including Cl<sub>2</sub>, HBR, N<sub>2</sub> and additional element ( col.9, L.6-17) to remove various residue including fluorine (read as reacts with fluorine to create a gas-phase reaction, col.1, L.32) each time after plasma processing a wafer (Fig.3).

Qian et al do not explicitly teach removing aluminum fluoride deposit. However, since the steps for removing residue from the etching chamber wall in Qian are similar to those instantly claimed, removing the aluminum fluoride deposits, would also be reasonably expected within the teaching of Qian. It is axiomatic that one who performs the steps of the known process must necessarily produce all of its advantages. Mere recitation of a newly discovered function or property, that is inherently possessed by things in the prior art does not cause a claim drawn to these things to distinguish over the prior art.

For claim 3, Qian et al teach a method for etching a substrate in an etching chamber, and simultaneously cleaning a surface of the etching chamber wall comprising the steps of placing a substrate on a chuck disposed within the etching chamber (read as placing a Si wafer, with no patterns printed thereon, Fig.2, #145, col.7, L.57); providing a period for cleaning a residue deposited in the etching chamber by generating a plasma from a processing gas including Cl<sub>2</sub>, HBR, N<sub>2</sub> and additional element ( col.9, L.6-17) to remove various residue including fluorine (read as reacts with

fluorine to create a gas-phase reaction, col.1, L.32) each time after plasma processing a wafer (Fig.3).

Qian et al do not explicitly teach removing aluminum fluoride deposit. However, since the steps for removing residue from the etching chamber wall in Qian are similar to those instantly claimed, removing the aluminum fluoride deposits, would also be reasonably expected within the teaching of Qian. It is axiomatic that one who performs the steps of the known process must necessarily produce all of its advantages. Mere recitation of a newly discovered function or property, that is inherently possessed by things in the prior art does not cause a claim drawn to these things to distinguish over the prior art.

For claim 8, since a second electrode (Fig.3, #135, col.7, L.56) serves as a chuck for semiconductor wafer, and plasma is generated while semiconductor wafer is placed on the chuck during processing, the step "applying high-frequency power to the Si wafer through the substrate holder" is within the teaching of Qian et al.

For claim 9, since a second electrode (Fig.3, #135, col.7, L.56) serves as an chuck for semiconductor wafer, and a plasma is generated while semiconductor wafer is placed on the chuck during processing, the step "applying high-frequency power to the Si wafer through the substrate holder" is within the teaching of Qian et al. Qian et al do not teach the high frequency power being applied corresponds to a frequency of 400kHz and is equal to or greater than 0.11W per unit area (1cm<sup>2</sup>) of the Si wafer.

Regarding claim 9 reciting the high frequency power being applied corresponds to a frequency of 400kHz and is equal to or greater than 0.11W per unit area (1cm<sup>2</sup>) of

the Si wafer, it is noted that these parameters are result effective, because they affect the efficiency of cleaning the etching chamber wall and etching semiconductor wafer, and one skilled in the art would modify different variables to achieve optimum result, consult, *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

For claims 15 and 17, note that Qian et al teach an processing gas can contain SiCl<sub>4</sub> (col.8, L.55-58).

For claim 16, Qian et al do not teach a portion of material constituting the vacuum container includes Si. The presence of Si in the vacuum container relates to structure, not function. It has been held that to be entitled to weight in method claims, the recited structure limitations therein must affect the method in a manipulative sense.

6. Claims 3, 10 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitsunai et al (US 6,186,153) in view of Benzing (US 4,786,352).

Kitsunai et al teach a method for removing deposition films which adhere to an inner walls of a semiconductor manufacturing apparatus (abstract) comprising the steps of providing a period for cleaning an aluminum fluoride deposit in the semiconductor manufacturing apparatus by generating plasma containing BCl<sub>3</sub> and Cl<sub>2</sub> (read as reacts with fluorine to create a gas phase reaction, col.5, L.37-42)

Kitsunai et al remain silent about the step of performing a cleaning step either each time after plasma processing a wafer or plural wafers or before and after plasma processing.

Examiner takes official notice that cleaning a semiconductor chamber after plasma processing certain number of semiconductor wafer is well known in the art of semiconductor processing/manufacturing.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the method of Kitsunai et al by having a cleaning step each time after plasma processing a wafer or plural wafers to prevent contaminating semiconductor wafer, when enhance process efficiency.

Kitsunai et al do not teach using hydrobromic gas and additionally an element.

Benzing teaches the equivalency of using a gas mixture of  $\text{BCl}_3$  and  $\text{Cl}_2$  with a gas mixture of  $\text{HBr}$ ,  $\text{Cl}_2$  and an additional element (col.5, L.33-36).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the gas mixture of  $\text{BCl}_3$  and  $\text{Cl}_2$  of Kitsunai et al with a gas mixture of  $\text{HBr}$ ,  $\text{Cl}_2$  and an additional element as mentioned Benzing because the substitution of art recognized equivalents as shown by Benzing is within the level of ordinary skill in the art.

For claim 10, note that Kitsunai et al teach an earth (Fig.1, #7, col.3, L.51). Kitsunai et al and Benzing do not teach a step of providing a ratio of an area of an earth to the area of an inner wall of the vacuum container in contact with plasma 40% or more.

Regarding claim 10, a ratio of an area of an earth to the area of an inner wall of the vacuum container in contact with plasma 40% or more, it is noted that these parameters are result effective, because they affect the efficiency of cleaning the



etching chamber wall and reliability of the cleaning process, and one skilled in the art would modify different variables to achieve optimum result, consult, *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

For claim 14, note that Kitsunai et al teach sequential execution of a cleaning operation using SF<sub>6</sub> (read as providing a period for generating plasma containing SF<sub>6</sub> prior to said period for generating plasma with the chlorine gas and hydrobromic gas, Kitsunai et al, col.5, L.46-47).

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1, 3, 8-10 and 13-17 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEPHEN KO whose telephone number is (571)270-3726. The examiner can normally be reached on Monday to Thursday, 7:30am to 5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SK  
/Michael Kornakov/  
Supervisory Patent Examiner, Art Unit 1792